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Electron transport in DNA sequencing connected to silicene electrodes: design of electronic devices

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Abstract
In this article, electron transport has been studied for a system consisting of a double-stranded DNA molecule with a telomeric sequence attached to two semi-finite electrodes of silicic nanoribbons. This study has been investigated using the tight-binding model and Green's function approach. By placing the DNA molecule in the middle of two silicon nanorod electrodes, we can see the electron passing channels in the system, and also the type of organic base connected to the electrodes showed a significant effect on the electron transport of the system. Calculations show that telomeric sequences such as TAGGGT, TTAGGG, and GTTAGG have the highest electrical conductivity compared to other sequences. We found that by controlling the gate voltage in the system, It is possible to control the current or load delivery. Also, by increasing the number of organic base pairs in the system, we saw an increase in current, and by controlling the number of organic base pairs, the transport characteristics can be controlled. This ability to control has many uses and a significant role in the manufacture of electronic components.

Keywords: DNA molecule, electron transport, electrical circuits, Green's approach

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